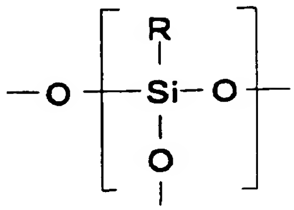
WHAT IS CLAIMED IS:

1. A piezoelectric/electrostrictive film type device comprising: a substrate which is formed of ceramic; and a piezoelectric/electrostrictive operation portion including a lower electrode, piezoelectric/electrostrictive layer, and upper electrode which are successively stacked on the substrate and including a projecting end of the piezoelectric/electrostrictive layer with which an upper surface of the lower electrode and a lower surface of the upper electrode are coated, characterized in that a projecting portion of the piezoelectric/electrostrictive layer is a connecting material constituted of a hybrid material in which inorganic particles are scattered in a matrix of a polymer compound, and is connected to the substrate.

2. The piezoelectric/electrostrictive film type device according to claim 1, wherein the connecting material is constituted of the hybrid material in which silica particles are scattered in the matrix containing a polysiloxane polymer as a main component.

3. The piezoelectric/electrostrictive film type device according to claim 2, wherein the polysiloxane polymer is a polysiloxane polymer in which a substituent group is introduced in a part shown in the following general formula (1):



..... (1)

where R is at least one alkyl group selected from a group consisting of a methyl group, ethyl group, and propyl group, an aryl group, an alkenyl group, or at least one substituent alkyl group selected from a group consisting of a γ-methacryloxypropyl group, γ-glycidoxypropyl group, γ-chloropropyl group, γ-mercaptopropyl group, γ-aminopropyl group, and trifluoromethyl group.

4. The piezoelectric/electrostrictive film type device according to claim 1, wherein an average particle diameter of the inorganic particles is in a range of 5 nm to 1 μm.

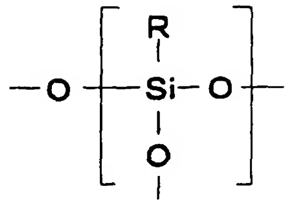
5. The piezoelectric/electrostrictive film type device according to claim 4, wherein the inorganic particles have a two-peaks particle size distribution, and a ratio (D/C) of an average particle diameter (C) of large-diameter inorganic particles having a particle diameter larger than that corresponding to a inflection point existing between two peaks to an average particle diameter (D) of small-diameter inorganic particles having a particle diameter not more than that corresponding to the inflection point is in a range of 0.05 to 0.7.

6. A piezoelectric/electrostrictive film type device comprising: a substrate which is formed of ceramic; and a piezoelectric/electrostrictive operation portion including a plurality of electrodes and a plurality of piezoelectric/electrostrictive layers which are alternately stacked on the substrate and including a projecting end of each piezoelectric/electrostrictive layer with which upper and lower surfaces of each electrode are coated, characterized in that a projecting portion of the piezoelectric/electrostrictive layer is a connecting material constituted of a hybrid material in which inorganic particles are scattered in a matrix of a polymer compound, and is connected to the substrate, and the electrodes are disposed in uppermost and lowermost layers in a multilayered structure of the piezoelectric/electrostrictive layers and electrodes.

7. The piezoelectric/electrostrictive film type device according to claim 6, wherein the connecting material is constituted of the hybrid material in which silica particles are scattered in the matrix containing a polysiloxane polymer as a main component.

8. The piezoelectric/electrostrictive film type device according to claim 7, wherein the polysiloxane polymer is a polysiloxane polymer in which a substituent group is introduced in a part shown in the following general formula

(1):



..... (1)

where R is at least one alkyl group selected from a group consisting of a methyl group, ethyl group, and propyl group, an aryl group, an alkenyl group, or at least one substituent alkyl group selected from a group consisting of a γ-methacryloxypropyl group, γ-glycidoxypropyl group, γ-chloropropyl group, γ-mercaptopropyl group, γ-aminopropyl group, and trifluoromethyl group.

9. The piezoelectric/electrostrictive film type device according to claim 6, wherein an average particle diameter of the inorganic particles is in a range of 5 nm to 1 μm.

10. The piezoelectric/electrostrictive film type device according to claim 9, wherein the inorganic particles have a two-peaks particle size distribution, and a ratio (D/C) of an average particle diameter (C) of large-diameter inorganic particles having a particle diameter larger than that corresponding to a inflection point existing between two peaks to an average particle diameter (D) of small-diameter inorganic particles having a particle diameter not more than that corresponding to the inflection point is in a range of

0.05 to 0.7.

11. A manufacturing method of a piezoelectric/electrostrictive film type device in which a piezoelectric/electrostrictive operation portion including a successively stacked lower electrode, piezoelectric/electrostrictive layer, and upper electrode is disposed on a substrate formed of ceramic, the method characterized by:

coating an upper surface of the lower electrode, and a lower surface of the upper electrode with the piezoelectric/electrostrictive layer; projecting an end of the piezoelectric/electrostrictive layer; applying a coat solution obtained by mixing a polymerizable oligomer and/or a polymerizable monomer and inorganic particles in a dispersing medium between at least the projecting portion of the piezoelectric/electrostrictive layer, and the substrate; drying the coat solution to form a connecting material; and connecting the projecting portion of the piezoelectric/electrostrictive layer to the substrate by the connecting material.

12. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 11, wherein as the coat solution, a solution obtained by mixing a siloxane oligomer and silica particles in a polar dispersing medium is used.

13. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 12, wherein the siloxane oligomer is a polymerizable monomer or polymerizable oligomer shown in the following general formula (2):

$R_nSi(OR')_{4-n}$ ... (2),

where R denotes at least one alkyl group selected from a group consisting of a methyl group, ethyl group, and propyl group, an aryl group, an alkenyl group, or at least one substituent alkyl group selected from a group consisting of a γ-methacryloxypropyl group, γ-glycidoxypropyl group, γ-chloropropyl group, γ-mercaptopropyl group, γ-aminopropyl group, and trifluoromethyl group, R' denotes at least one alkyl group selected from the group consisting of the methyl group, ethyl group, propyl group, and butyl group, the aryl group, and the substituent alkyl group selected from a β-methoxy ethoxy group and acetyl group, and n is an integer of 0 to 3.

14. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 11, wherein the average particle diameter of the inorganic particles is in a range of 5 nm to 1 μm.

15. The manufacturing method of the piezoelectric/electrostrictive film type device according to

claim 14, wherein the inorganic particles have a two-peaks particle size distribution, and a ratio (D/C) of an average particle diameter (C) of large-diameter inorganic particles having a particle diameter larger than that corresponding to an inflection point existing between two peaks to an average particle diameter (D) of small-diameter inorganic particles having the diameter not more than that corresponding to the inflection point is in a range of 0.05 to 0.7.

16. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 11, wherein the applying of the coat solution is performed by a spin coat process at a rotation speed of 1500 rpm or more.

17. A manufacturing method of a piezoelectric/electrostrictive film type device in which a plurality of electrodes and a plurality of piezoelectric/electrostrictive layers are alternately stacked on a substrate formed of ceramic to dispose a piezoelectric/electrostrictive operation portion including a multilayered structure, the method characterized by:

coating upper and lower surfaces of each electrode with each piezoelectric/electrostrictive layer; projecting an end of the piezoelectric/electrostrictive layer; applying a coat solution obtained by mixing a polymerizable oligomer and inorganic particles in a dispersing medium between at least

the projecting portion of the piezoelectric/electrostrictive layer, and the substrate; and drying the coat solution to form a connecting material for connecting the projecting portion of the piezoelectric/electrostrictive layer to the substrate.

18. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 17, wherein as the coat solution, a solution obtained by mixing the siloxane oligomer and silica particles in a polar dispersing medium is used.

19. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 18, wherein the siloxane oligomer is a polymerizable oligomer shown in the following general formula (2):

$R_nSi(OR')_{4-n}$ ... (2),

where R denotes at least one alkyl group selected from a group consisting of a methyl group, ethyl group, and propyl group, an aryl group, an alkenyl group, or at least one substituent alkyl group selected from a group consisting of a γ-methacryloxypropyl group, γ-glycidoxypropyl group, γ-chloropropyl group, γ-mercaptopropyl group, γ-aminopropyl group, and trifluoromethyl group, R' denotes at least one alkyl group selected from the group consisting of the methyl group, ethyl group, propyl group, and butyl group, the aryl group, and the substituent alkyl group selected from a β-

methoxy ethoxy group and acetyl group, and n is an integer of 0 to 3.

20. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 17, wherein the average particle diameter of the inorganic particles is in a range of 5 nm to 1 μm.

21. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 10, wherein the inorganic particles have a two-peaks particle size distribution, and a ratio (D/C) of an average particle diameter (C) of large-diameter inorganic particles having a particle diameter larger than that corresponding to an inflection point existing between two peaks to an average particle diameter (D) of small-diameter inorganic particles having the diameter not more than that corresponding to the inflection point is in a range of 0.05 to 0.7.

22. The manufacturing method of the piezoelectric/electrostrictive film type device according to claim 17, wherein the applying of the coat solution is performed by a spin coat process at a rotation speed of 1500 rpm or more.

23. The manufacturing method of the piezoelectric/electrostrictive film type device according to

claim 17, further comprising: disposing the plurality of electrodes in uppermost and lowermost layers in a multilayered structure of the piezoelectric/electrostrictive layers and electrodes.